THE HURRICANE HISTORY OF CENTRAL AND EASTERN VIRGINIA

Continuous weather records for the Hampton Roads Area of Virginia began on January 1, 1871 when the National Weather Service was established in downtown Norfolk. The recorded history of significant tropical storms that affected the area goes back much further. Prior to 1871, very early storms have been located in ship logs, newspaper accounts, history books, and countless other writings. The residents of coastal Virginia during Colonial times were very much aware of the weather. They were a people that lived near the water and largely derived their livelihood from the sea. To them, a tropical storm was indeed a noteworthy event. The excellent records left by some of Virginia's early settlers and from official records of the National Weather Service are summarized below. Learning from the past will help us prepare for the future.

SEVENTEENTH AND EIGHTEENTH CENTURIES

1635 August 24 First historical reference to a major hurricane that could have affected the VA coast.

1667 September6 It appears likely this hurricane caused the widening of the Lynnhaven River. The Bay rose 12 feet above normal and many people had to flee.

1693 October 29 From the Royal Society of London, There happened a most violent storm in VA which stopped the course of ancient channels and made some where there never were any.

1749 October 19 Tremendous hurricane. A sand spit of 800 acres was washed up and with the help of a hurricane in 1806 it became Willoughby Spit. **The Bay rose 15 feet above normal.**

Historical records list the following tropical storms as causing significant damage in Virginia: September 1761; October 1761; September 1769; September 1775; October 1783; September 1785; July 1788.

NINETEENTH CENTURY

1806 August 23 Called the Great Coastal Hurricane of 1806.

1821 September 3 One of the most violent hurricanes on record.

1846 September 8 Hatteras and Oregon Inlets were formed.

1876 September17 Average 5 minute wind speed at Cape Henry was 78 mph; 8.32" of rain

1878 October 23 Cobb and Smith Islands, on the Eastern Shore, were completely submerged. Average 5 minute wind at Cape Henry was 84 mph. Eighteen died when the A.S. Davis went ashore near Virginia Beach.

1879 August 18 Tide in Norfolk 7.77 feet above Mean Lower Low Water. Average 5 minute wind speed at Cape Henry 76 mph with 100 mph estimated gusts.

1887 October 31 Average 5 minute wind speed at Cape Henry 78 mph. The storm caused a record number of marine disasters.

1893 August 23 Average 5 minute wind speed at Cape Henry 88 mph.

1894 September29 Five minute wind speed at Cape Henry 80 mph; gusts to 90 mph.

1897 October 25 Lasted 60 hours. Norfolk tides 8.1 feet above Mean Lower Low Water.

1899 October 31 Average 5 minute wind at Cape Henry 72 mph. Tide in Norfolk reached 8.9 feet above MLLW

Noteworthy storms also occurred in June 1825, August 1837, August 1850 and September 1856.

TWENTIETH CENTURY

1903 October 10 Average 5 minute wind speed at Cape Henry 74 mph, the tide in Norfolk reached 9 feet above MLLW.

1924 August 26 Average 1 minute wind speed 72 mph at Cape Henry.

1924 September30 Fastest 1 minute wind speed in Norfolk 76 mph.

1926 August 22 Fastest 1 minute wind speed in Cape Henry 74 mph.

1928 September19 Fastest 1 minute wind speed at Cape Henry 72 mph. The tide reached 7.16 feet above MLLW in Norfolk.

1933 August 23 This hurricane established record high tide of 9.8 feet above Mean Lower Low Water. 18 people died. Highest 1 minute wind speed in Norfolk was 70 mph, 82 mph at Cape Henry, and 88 mph at NAS, Norfolk.

1933 September16 Fastest 1 minute wind speed was 88 mph at NAS, Norfolk, 75 mph at the NWS City Office, and 87 mph at Cape Henry. The tide reached 8.3 feet above MLLW..

1936 September18 The fastest 1 minute wind speed was 84 mph at Cape Henry and 68 mph at the NWS City Office. The tide reached 9.3 feet above MLLW and is the second highest tide of record.

1944 September14 Fastest 1 minute wind speed was 134 mph at Cape Henry which is the highest speed of record in this area. Gusts were estimated to 150 mph. The NWS City Office recorded 72 mph with gusts to 90 mph.

1953 August 14 **BARBARA**. The fastest 1 minute wind speed was 72 mph at Cape Henry, 63 mph with gusts to 76 mph at Norfolk Airport.

1954 October 15 **HAZEL**. Fastest 1 minute wind speed was 78 mph at Norfolk Airport with gusts to 100 mph which is the highest wind speed of record for the Norfolk Airport location. A reliable instrument in Hampton recorded 130 mph.

1959 September30 **GRACIE**. Passed through western Virginia, 6.79 inches of rain at Norfolk Airport in 24 hours. Storm spawned a tornado eight miles west of Charlottesville, killing 11 people.

1960	**September12**	**DONNA**. Fastest 1 minute wind speed was 73 mph at Norfolk Airport, 80 mph at Cape Henry and estimated 138 mph at Chesapeake Light Ship. Lowest pressure of 28.65 inches holds the area record for a tropical storm. 3 deaths.
1964	**September 1**	**CLEO**. A storm noted for its rain. 11.40 inches in 24 hours is the heaviest in the coastal area since records began in 1871.
1969	**August 19**	**CAMILLE**. Made landfall in Mississippi on August 17. The storm tracked northward and dumped a record 27 inches of rain in the Virginia mountains, primarily in Nelson County. Flash flooding took the lives of 153 people.
1971	**August 27**	**DORIA**. The fastest 1 minute wind speed 52 mph at Norfolk Airport and 71 mph at NAS, Norfolk.
1972	**June 21**	**AGNES**. Made landfall on the Gulf Coast of Florida. As the storm crossed Virginia, it dumped 13.6 inches of rain on the east slopes of the Blue Ridge Mountains. The James River crested at a record high in Richmond. Virginia sustained $222 million in damage, and 13 people died from flash flooding.
1979	**September 5**	**DAVID.** Passed through central Virginia. Spawned 2 severe tornadoes - one in Newport News with over $2 million in damage and one in Hampton with a half million dollars in damage.
1985	**September27**	**GLORIA.** Passed 45 miles east of Cape Henry. Fastest 1 minute wind speed WNW 46 mph, peak gust 67 mph at the Airport, NE 94 mph gust to 104 mph at the South Island CBBT. Highest tide 5.3 feet above Mean Lower Low Water, storm rainfall 5.65 inches and total Virginia damage $5.5 million.
1986	**August 17**	**CHARLEY**. The weak center passed over southeast Virginia Beach. Fastest 1 minute wind speed NNE 40 mph gust E 63 mph at Norfolk International Airport; NE 94 mph gust to 104 mph at South Island CBBT; and NE 54 mph gust to 82 mph at Cape Henry. Highest tide 5.5 feet above MLLW. Less than $1 million in damage in Virginia.
1996	**July 12-13**	**BERTHA**. Passed over portions of Suffolk and Newport News. Fastest 1 minute wind speed SE 35 mph gust to 48 mph at Norfolk International Airport. Bertha spawned 4 tornadoes across east-central Virginia. The strongest, an F1 tornado moved over Northumberland county injuring 9 persons and causing damages of several million dollars. Other tornadoes moved over Smithfield, Gloucester and Hampton.
1996	**September 5**	**FRAN**. Passed well west of the area over Danville. Fastest 1 minute wind speed SE 41 mph gust to 47 mph at Norfolk International Airport. Rainfall amounted to only 0.20 of an inch In Norfolk.
1998	**August 27**	**BONNIE**. Tracked over the northern Outer Banks. Fastest 1 minute wind speed NE 46 mph with gust to 64 mph at Norfolk Airport. NE 90 mph with gust to 104 mph at CBBT. 4-7 inches of rain combined with near hurricane force winds knocked out power to 320,000 customers. Highest tide 6.0 FT above MLLW. Most significant storm since 1960.
1999	**August 30 September4**	**DENNIS**. Produced one of the most prolonged period of tropical storm conditions in eastern Virginia. Fastest 1 minute wind speed NE 43 mph with gust to 53 mph at Norfolk Int'l Airport. Storm total rainfall 3.30 inches. Significant beach erosion reported.
1999	**September6**	**FLOYD**. Passed directly over Virginia Beach on a track similar to Hurricane Donna in1960. Lowest pressure of 28.85" (977 MB) at Norfolk Int'l Airport 4th lowest for a hurricane this century. Fastest 1 minute wind NE 31mph with gust to 46 mph. Rainfall 6.80" with amounts of 12-18" in interior portions eastern Virginia. Franklin, VA reported 500 year flood of record. Largest peacetime evacuation in U.S. History.

TWENTY FIRST CENTURY

2003	**September18**	**ISABEL.** Made landfall near Ocracoke NC. The center passed west of Emporia and west of Richmond. Fastest 1 minute wind speed NE 54 mph with gusts to 75 mph at Norfolk NAS; NE 61 mph with gusts to 74 mph at the South Island CBBT. Highest tide at Sewells Point was 7.9 feet above MLLW, which was a 5 ft surge. Significant beach erosion was reported. Numerous trees and power lines down over a wide area, with over 2 million households without power in VA. VA damage was over $625 million, and there were over 20 deaths in VA.
2004	**August 3**	**ALEX** made its closest approach to land on August 3, 2004 with its center located about 9 nm southeast of Cape Hatteras/Outer Banks, NC as a Category 1. Alex produced locally heavy rainfall across portions of southeast Virginia, but little in the way of damage or flooding.
2004	**August 14**	**CHARLEY** made a second landfall near Cape Romain, SC as a weakening Category 1, after devastating portions of central and southwest Florida. Charley brought locally heavy rainfall and strong winds to much of southeast Virginia, especially near the coast. A wind gust to 72 mph was recorded at the Chesapeake Light buoy. In the U.S., 10 deaths and $14 billion in damage resulted from Charley.

2004 August 30 **GASTON.** made landfall near Awendaw, SC, on August 29, 2004 as a Category 1. Gaston weakened as it lifted northward through North Carolina, then northeastward across southeast Virginia on August 30th. Gaston produced a swath of 5 to 14 inch rains extending from Lunenburg and Mecklenburg counties northeast into Caroline and Essex counties. The heaviest rainfall, centered on the Richmond metro area, produced a major flash flood which killed 8 people. Five of these deaths resulted from people driving into flooded roadways. A total of 13 tornadoes were observed in central and eastern Virginia, all producing F0 damage. Total damage is estimated at $130 million.

2004 September 8 **FRANCES.** made landfall over east central Florida as a Category 2. It then moved northeast into the northern Gulf of Mexico, eventually turning north, making a second landfall in the panhandle of Florida, and then weakening into a tropical depression. It tracked through western Virginia, then northeast and offshore the mid Atlantic coast. A total of 6 tornadoes were observed in central and eastern Virginia, the strongest producing F1 damage.

2004 September17 **IVAN.** made landfall near the Florida/Alabama border as a category 3. It weakened to a tropical depression, and moved northeast, tracking along the Appalachian Mountains through western Virginia, then northeast and offshore the mid Atlantic coast. A total of 40 tornadoes were produced in Virginia, most in central and northern Virginia. This was a record single day outbreak for Virginia, and exceeded the previous ANNUAL tornado record (31). Most of these tornadoes were F0 or F1 in intensity, although 10 F2 tornadoes and 1 F3 tornado touched down in south central…west central and northern Virginia.

2005 July 7-8 **CINDY.** The remnants of Hurricane Cindy moved northeastward through south central and eastern Virginia on July 7th and the early morning hours of July 8th. Cindy's remnants produced 7 F1 tornadoes, which downed trees and damaged buildings from portions of south central Virginia into Virginia's Northern Neck. No injuries or deaths were associated with the tornadoes. Rainfall amounts in the 3 to 5 inch range were common across northern, central and southwest Virginia...with only minor flooding reported.

2006 September 1 **ERNESTO.** The remnants of Tropical Storm Ernesto interacted with an unusually strong high pressure are over New England to generate strong winds, heavy rainfall, and storm surge related tidal flooding and damage. Five to eight inch rainfall amounts were common across central and eastern Virginia. This rainfall caused flooding in many areas, although no substantial river flooding resulted from the heavy rain. Wind gusts of 60 to 70 mph occurred on the Eastern Shore of Virginia, as well as areas adjacent to the Chesapeake Bay from Yorktown northward. Tides were particularly high from communities adjacent to the York River, northward through the Rappahannock River to tidal portions of the Potomac River. Tides of 4 to 5 feet above normal, combined with 6 to 8 foot waves, caused significant damage to homes, piers, bulkheads, boats, and marinas across portions of the Virginia Peninsula and Middle Peninsula near the Chesapeake Bay and adjacent tributaries. Similar damage also occurred in Chincoteague and Wachapreague on the Virginia Eastern Shore. At some locations on the Middle Peninsula, Northern Neck and Eastern Shore, the tidal flooding and damage rivaled that from Hurricane Isabel in 2003. Power outages were widespread across Virginia's Northern Neck and Middle Peninsula.

2008 September 6 **Hanna.** Tropical Storm Hanna moved through the mid Atlantic region on September 6, 2008. The primary impact was wind, with gusts between 45 and 55 mph common from northeast North Carolina northeastward through the Lower Maryland Eastern Shore. On the Chesapeake Bay and adjacent Atlantic coastal waters, wind gusts around 60 mph were recorded. Hanna's winds downed trees in scattered areas from eastern North Carolina, and central and eastern Virginia, into the DELMARVA, but no substantial structural damage or coastal flooding occurred. Hanna brought beneficial rainfall to much of the region, with 1 to 5 inches falling. Antecedent dry conditions prevented any inland flooding as a result of the rainfall.

Hurricanes come close enough to produce hurricane force winds approximately three times every 20 years. Two or three times a century winds and tides produce considerable damage and significantly threaten life. Three known storms have been powerful enough to alter coastal features.

MLLW = Mean Lower Low water which is the mean of the lowest of the low tide values

Source - National Weather Service, Wakefield Office http://weather.gov/akq